

REMARKS

Claims 1-18 are pending in the application. Claims 1-6, 8-10, 12 and 14-16 are rejected. Claims 7, 11, 17 and 18 are objected to. Claim 7 is herein amended. New claim 19 is herein added. No new matter has been entered.

Objections to the Specification

The Examiner asserts that the title of the invention is insufficiently descriptive. Applicants herein change the title to “Method of Manufacturing a Semiconductor Device Having Gate or Tunnel Insulation Film.”

Claim Rejections - 35 U.S.C. §103(a)

Claims 1, 2, 4, 6, 8, 9, 12, 14 and 16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Misium et al. (US Patent 6,261,973) in view of Wong (US Patent 5,423,944). The Examiner concludes that it would have been obvious to combine the teachings of Misium and Wong because the oxidizing agents such as nitric acid help remove defects, as noted in Wong column 1, lines 20-25).

Claims 1, 3 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Wong in view of Dobuzinsky et al. (US Patent 5,412,246). The Examiner admits that Wong fails to disclose forming a second insulation film by low temperature processing. The Examiner concludes that it would have been obvious to combine the teachings of Dobuzinsky et al. in view of Wong because the oxidizing agents such as nitric acid help remove defects (see Wong column 1, lines 20-25).

Claims 13 and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over Wong in view of Dobuzinsky et al. as applied to claim 3 above, and further in view of Misium et al. The Examiner admits that Wong and Dobuzinsky et al. fail to teach the use of nitric acid and an ozone containing solution. The Examiner concludes that it would have been obvious to one of ordinary skill to combine the teachings of Wong, Dobuzinsky et al. and Misium et al. because the oxidizing agents such as nitric acid help remove defects (see Wong column 1, lines 20-25).

Claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Misium et al. in view of Wong. The Examiner concludes that it would have been obvious to make an oxide film greater than 1 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Claims 7, 11, 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Examiner admits that the prior art of record neither teaches nor suggests heating the nitric acid above 70 °C (claim 7) or forming a gate insulation film or a tunnel insulation film (claims 11, 18 and 19).

Applicants respectfully disagree with the above rejections because there is no suggestion to combine the references, which actually teach against their combination.

With respect to claim 1, Applicants note that Misium et al. discloses forming a first insulation film on the substrate then forming a second dielectric film on the first insulation film by low temperature processing. Wong discloses forming a first isolation film by using a strong acid solution.

However, neither Misium nor Wong teaches importance of combining each of them with oxidation by using a strong acid solution, in low-temperature oxidizing. More specifically, in thermal oxidation, since oxygen (O₂) is used while the temperature is ramped up to a desired degree, an oxide layer is produced. Applicants submit herewith an attached reference: *Applied Physics Letter* P. 1256, lines 8-16 of right column, which shows the above principles. There would be no need to combine thermal oxidation and processing by a strong acid solution. On the other hand, low-temperature oxidizing is a new alternative to thermal oxidation, but there is no necessity to combine low-temperature oxidizing and processing by a strong acid solution. One skilled in the art would not combine the teachings of Misium and Wong.

Accordingly, Misium and Wong cannot teach the principle of claim 1 of combining oxidation by using strongly acidic solution and low-temperature oxidation.

Therefore, Applicants submit that the obviousness rejection is not proper, and should be withdrawn.

Applicants herein add new Claim 19 of the present invention has a feature that; after the first isolation is formed, the first isolation film is left as it is for a fixed time, then the second isolation film is formed so as to wrap the first isolation film by low temperature processing.

Regarding claim 19, as shown in Fig. 8B, even when the standing time after oxidizing by using a strongly acidic solution (e.g. nitric acid in Fig. 8B) becomes longer, the insulation degradation is prevented. Whereas, in the conventional processing by using hydrochloric acid, there exists a problem that insulation degradation becomes more pronounced with the elapse of the standing time, as described in “Background of the Invention” and Fig. 8A.

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Response under 37 C.F.R. § 1.111
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Applicants note that none of the references cited by the Examiner disclose or suggest leaving an isolation film as it is after oxidization by a strongly acidic solution as in the present invention.

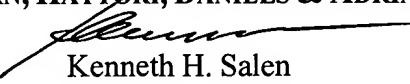
In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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